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Profitability of Canadian- versus U.S.-Controlled Enterprises

by Paul Warren

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Abstract

This paper examines the course of profitability of large Canadian-resident enterprises over the period 1990-98. It focuses first on the differences in the profitability of Canadian-controlled and U.S.-controlled enterprises and asks whether there are differences in *trends* in profitability by country of control over the business cycle experienced in the 1990s. It uses micro-economic data on the profitability of large non-integrated firms to investigate the role played by market share in determining profitability in each group and the extent to which profits that deviate from the mean are forced quickly or slowly back to their long-run equilibrium values. Both facets of profit behaviour are related to the nature of competition in the markets served by firms. Finally, it examines the role played by changes in the Canada-U.S. exchange rate in determining profitability in order to understand the extent to which each group uses these changes to adjust their foreign prices and thus to affect reported Canadian profits.

Keywords: profitability, U.S.-controlled enterprises, Canadian-controlled enterprises, panel data, GMM

Executive summary

This paper examines the differences in the profitability of U.S.-controlled enterprises operating in Canada relative to their Canadian-controlled counterparts. There is a considerable body of literature suggesting that such differences might be expected to exist. Research suggests that foreign-controlled plants in Canada exhibit higher labour productivity, and tend to adopt new advanced technologies earlier and faster than their domestically-controlled counterparts during the 1990s.

In contrast to these earlier studies however, the focus of this paper is on the 'bottom line'—i.e., on answering the question of whether the superior performance found in areas such as productivity translate into superior *profit* performance.

The paper uses micro-economic data on more than 2,000 large non-integrated enterprises to model comparative profitability in two different ways.

One modeling framework focuses on the question of whether Canadian- and U.S.-controlled enterprises exhibited different trends in profitability over the business cycle of the 1990s. In this model, we control for the influence of market power and for the role of lagged profitability (i.e., profitability in the previous period) in determining profitability in the current period.

Using price-cost margins as our measure of 'profitability' in this model, we find little evidence of a significant divergence in the profitability of Canadian and U.S. enterprises during this period. The price-cost margins of Canadian enterprises increase by roughly 1.3% over the period, compared with a 0.4% increase for their U.S.-controlled counterparts. If we employ an alternate profitability measure—the return on capital employed—there is slightly stronger evidence of divergence; such returns grow by 1.6 percentage points for U.S.-controlled enterprises, whilst declining by 1.9 percentage points for Canadian-controlled enterprises.

In addition to playing a role as a 'control variable', lagged profitability is important in our model due to the importance which some authors have placed on the degree of profit persistence as an indicator of the extent to which enterprises are forced to respond to competitive pressures in the markets in which they operate. If we consider the price-cost margin measure of profitability, the degree of persistence in profits is similar, regardless of the nature of ownership. In contrast, there is more evidence that the lagged return on capital is an important determinant of the current return for Canadian enterprises than there is for U.S. enterprises, suggesting that the former may be less likely to be forced to respond to competitive pressures than their U.S. counterparts.

This hypothesis is supported by the fact that market share appears to play a larger role in determining the profitability of Canadian enterprises, regardless of the measure of profitability employed.

A second modeling framework that is presented in the paper focuses on the roles played by aggregate demand and the exchange rate (in addition to those played by market share and lagged profitability) in determining profitability.

Once again, profitability is defined in two different ways within this framework. When price-cost margins are considered, market share and the exchange rate appear to be more important for Canadian-controlled enterprises than for U.S.-controlled enterprises; in contrast the state of aggregate demand (as measured by GDP growth) is more important for U.S.-controlled enterprises.

As far as the return on capital employed is considered, market share is—once again—a more important determinant of profitability (measured in this way) for Canadian-controlled enterprises than for U.S.-controlled enterprises, as is—in this case—GDP growth. The exchange rate is important for both Canadian-controlled and U.S.-controlled enterprises; a depreciation in the Canadian dollar increases profitability to roughly the same extent regardless of the nature of enterprise ownership.

1. Introduction

> *"It is a stylised fact of the multinational enterprise literature that, on average, foreign owned companies outperform domestic firms. A substantial body of work has shown that the affiliates of multinationals typically enjoy higher productivity, pay higher wages, and usually enjoy greater profitability than their indigenous counterparts."*
>
> Conyon et al. (2002)

Enthusiastic endorsements—such as that above—notwithstanding, the Canadian attitude towards the foreign ownership of Canadian-resident corporations has long been an ambivalent one.

Arguments *against* foreign ownership have been made on the grounds of both economic efficiency[1], and on the grounds that there are likely to be undesirable consequences for Canadian *political* sovereignty of having assets controlled outside Canada—particularly by corporations in the United States.

In an interview in 1967, Walter Gordon—then chairman of a Cabinet committee with responsibility for enquiring into the effects of foreign ownership on the Canadian economy—stated that:

> *"Already, in my view, we have surrendered too much ownership and control of our natural resources and our key industries to foreign owners, notably those in the United States...with economic control inevitably goes political control."*
>
> Levitt (1970), p.2

Political concerns to one side, economic studies of multinationals have focused on the reasons that cause firms to extend their boundaries and to invest abroad, thereby becoming businesses that not only trade across nations but also extend their production boundaries across nation states. Building on transaction-cost theories, Caves (1971) posits that these firms overcome problems in arm's-length transactions in firms that possess intangible assets that are difficult to transfer in markets, thereby improving the way in which international transactions take place.

Foremost among the assets that are difficult to transfer in arm's-length markets are the capabilities that involve innovation and the application of advanced technologies.[2] This theory suggests that multinational firms will develop in areas where technology transfer is important and will facilitate the transfer of new technologies across countries. Not surprisingly, then there is a substantial literature that looks at the extent to which the plants of multinationals use different technologies than domestic firms. The Canadian evidence (Baldwin, Rama and Sabourin, 1999) indicates that foreign-controlled plants in the manufacturing sector have been

1. In the early 1960s, Yale economist Stephen Hymer argued that most inward FDI to Canada "was accounted for by a small number of firms operating in industries that the economist calls oligopolistic...if what foreign ownership is about is big business, or trusts, then what the policy towards foreign ownership should be about is a combination of keeping business competitive and regulating the trusts." (Watkins, in Levitt (1970), p.XV).
2. Others involve brand-name assets and managerial skills.

adopting new advanced technologies earlier and faster than their domestic counterparts during the 1990s. Similar results are reported in the food-processing sector (Baldwin, Sabourin and West, 1999). In the same vein, Baldwin and Hanel (2003, ch. 10) report that foreign firms are found to be more likely to introduce an innovation than domestic firms.

A number of studies follow up differences in technology by examining differences in labour productivity between domestic and foreign plants (see Dunning, 1993, p. 424). These studies invariably find significant productivity differences between foreign (mainly U.S. multinationals) and domestic plants. Studies in Canada suggest that higher foreign ownership leads to higher labour productivity at the industry level (Saunders, 1980). Early work by authors such as Safarian (1969), Raynauld (1972) and Covari and Wisner (1991) identified higher average productivity levels of foreign affiliates compared with those of Canadian-controlled firms. Within Canadian manufacturing industries, foreign plants have been found to have a higher labour productivity compared to domestic plants and to have seen this difference grow recently (Baldwin and Dhaliwal, 2001). Some of these differences in labour productivity may result from higher capital intensity (Globerman, Ries and Vertinsky, 1994), thereby suggesting that one of the superior capabilities of multinationals is related to their ability to master more capital intensive processes. More recently, Baldwin and Gu (2003) note that the process of turnover (closing down old plants and opening up new plants) in the foreign-controlled segment is contributing much more to productivity growth than turnover in the domestic sector. Many studies have suggested that, in addition to exhibiting superior productivity, 'foreign' firms exhibit a willingness to pay higher wages, engage in more R&D, and train more.[3]

It is important to recognize at the outset that—whilst we are interested in hypotheses surrounding the impact of foreign- versus domestic-control on performance in a *Canadian* context—the nature of the hypotheses found in the extant literature tends to be somewhat broader than the question of whether specifically *Canadian* control is a 'bad' thing whenever and wherever it occurs.

Hypotheses concerning the relative performance of 'foreign' and 'domestic' entities have also been advanced and tested in contexts in which 'domestic' has meant 'U.S.', 'British' or other economies. Discussing work by Doms and Jensen (1998) that examined the performance of 'domestic' (United States') firms relative to 'foreign' (non-U.S. firms), Head stresses that differences in (wage and productivity) performance remaining in that work *after* differences in plant attributes have been controlled for

> "*does not appear to derive from [such plants] "foreignness"; rather it appears that plants owned by multinational corporations pay more and have higher productivity*"
>
> Head, p.256 in Baldwin, Lipsey and Richardson (1998)

3. For example Conyon, Girma, Thompson and Wright (2002) find that foreign-controlled firms in the U.K. pay equivalent employees 3.4% more than domestic firms do.

Confirming this finding, Baldwin and Hanel (2003) report that while there were differences in the percentage of foreign firms and domestic firms that innovated, there were no differences between foreign multinationals and domestic multinationals. This is what the transactions theory of the multinational would predict. Both foreign and domestic multinationals should be expected to possess intangible assets that contributed to their original decision to become multinationals.

While the evidence on relative technology use and relative labour productivity is therefore convincing, many authors have pointed to offsetting problems that may develop from the presence of multinationals. An extensive literature has examined the extent to which multinationals may use artificial transfer prices to shift taxes across jurisdictions to reduce tax burdens.[4] Transfer pricing not only distorts national tax programs, but it leads to the mismeasurment of GDP and of productivity.

The second issue that is relevant here is the extent to which multinationals affect market structure and competition in the host country. A relationship between market concentration and foreign investment is to be expected because both are driven by similar factors. And at least one theory suggests that loosely knit oligopolies that exist in U.S. markets may export their market structure to foreign markets via foreign investment (see Caves, 1982, pp. 98-100). Regardless of its effect on structure, the interesting question is the impact of the presence of multinationals on firm performance. Does the presence of a dominant firm that is foreign facilitate less competitive behaviour?

Related sets of research questions have asked whether other aspects of market performance are affected by the presence of foreign firms. The severity of macro-economic business cycles is affected by the extent to which firms react to domestic conditions. Because of their greater ability to arbitrage capital markets across countries, foreign firms may be less affected by cash flow problems that are highly correlated with recessions. And in turn, this may make investment less sensitive in foreign firms. Similarly, profits in foreign firms may be less sensitive to local conditions if the foreign firms are more diversified across international markets whose cycles are not perfectly correlated.

2. Outline of paper

This paper addresses a number of these issues by focusing on differences in the profitability of U.S.-controlled and Canadian-controlled firms operating in Canada. It chooses the period of the 1990s. This was a period in which corporate tax rates in Canada were above those in the United States according to authors such as Mintz (2002).[5] And several observers have suggested that the incentive to transfer profits out of Canada might have therefore led transfer prices that are used for inter-affiliate transfers between multinationals to become increasingly unrealistic over this time. We investigate this issue by asking whether there is evidence that multinational firms operating in Canada during this period were less profitable than domestic firms or whether

4. See Caves (1982, ch. 8) and Dunning (1992, ch. 18).
5. See also McKenzie and Thompson (1997).

changes in their profitability suggests that increasing amounts of profits were being transferred out of the country.

In investigating the question of whether U.S.-controlled firms have demonstrated (increasingly) superior performance relative to their Canadian counterparts, this paper attempts to control for a number of factors that might be thought likely, *a priori*, to impact profitability—addressing a number of questions that are of importance in their own right, along the way. Specifically, we model the profitability of individual firms as a function of nationality and examine the effect of several additional factors:

- their market share
- GDP growth
- the Canada-U.S. exchange rate

We examine the effect of market structure by asking whether the market share of the firm is related to the profits of individual firms. There is a considerable body of literature that postulates a role for market share in determining profit margins, particularly within the context of a homogeneous product oligopoly model.[6] That literature suggests that the profit margin of an enterprise will be positively associated with that enterprise's market share. This hypothesis is examined in this paper via inclusion of a measure of market share in an econometric specification designed to "explain" profits. If foreign-controlled firms are able to exploit their dominance more than domestic firms, we would expect the coefficient on market share to be greater for foreign-controlled than for domestically-controlled firms.

The regressions presented subsequently in this paper also address the question of 'the persistence of profitability'—an issue that has been studied by Mueller (1990) and others. This literature asks how rapidly profits move towards a long-run mean when disturbed from this point by demand or supply shocks.[7] This issue is regarded as an important one by authors who view such persistence as evidence that (some) companies may not face the type of vigorous competitive forces that would tend to quickly return above-average rates of profitability to economy-wide (or industry-wide) means. The size of the estimated coefficients on lagged profitability variables in the profit regression equations can be viewed as indicative of the degree of 'profit persistence' exhibited with the sub-samples examined. Longer 'persistence' of profitability in foreign firms would suggest less competitive pressures in this segment.

We also ask how profitability is affected by the exchange rate. This issue arises from 'pricing to market' (PTM) models, that can be found in the trade/international economics literature since the early 1990s. These models predict a relationship between exchange rate movements and changes in mark-ups charged by exporters, which will depend upon the shape of the demand curve faced by exporters in foreign markets. This issue is examined in this paper via the inclusion of a measure of the Canada-U.S. exchange rate in the relevant profitability equations.

The third issue that we examine is the behaviour of profitability over the business cycle. The game-theoretic models of oligopoly studied by Green and Porter (1984) as well as Rotemberg

6. See Clarke and Davies (1982).
7. See Baldwin (1995, ch. 13) for a discussion of the results for the manufacturing sector.

and Saloner (1986), suggest that the strength of oligopolistic coordination may change across the business cycle. We examine the extent to which the competing predictions of these models are matched by the data by the inclusion of a GDP growth variable.

In addressing each of these three issues, we allow for the possibility that differences exist between Canadian-controlled and U.S.-controlled enterprises.[8] Such differences might exist for any of a number of reasons, such as differing degrees of export orientation, varying stockholder preferences over possible time profiles for profits, etc.

In addition to addressing the 'structural' issues outlined above, this paper also presents results from a model designed to focus more on the time-series properties of the dataset—in particular on the question of whether trends in profitability differed by country of control over the period.

While it is difficult to arrive at a definitive answer to this question (to distinguish 'trend' from 'cycle') based on just 9-years of data, we pursue this question by estimating a pair of country-of-control specific profitability models, each containing a set of quarterly dummies to pick up any country and time-period specific 'fixed' effects remaining in the data after controlling for perhaps the major influences on profitability—lagged profitability and market share.

The data employed in this study comes from an administrative tax file kept by Statistics Canada that covers a wide range of financial data for Canadian-resident enterprises over the period 1988-1998. These data are derived from quarterly surveys along with administrative data and are used to prepare the aggregated annual financial statistics of the corporate sector.

We focus in this paper on those enterprises that are *large*, *non*-integrated, and exhibit a degree of continuity (in the sense of being present in the dataset for seven or more contiguous—i.e., adjacent years). This is required if we are tracking changes over time in profitability of continuous entities. The meaning of each of these qualifiers will be made clear below.

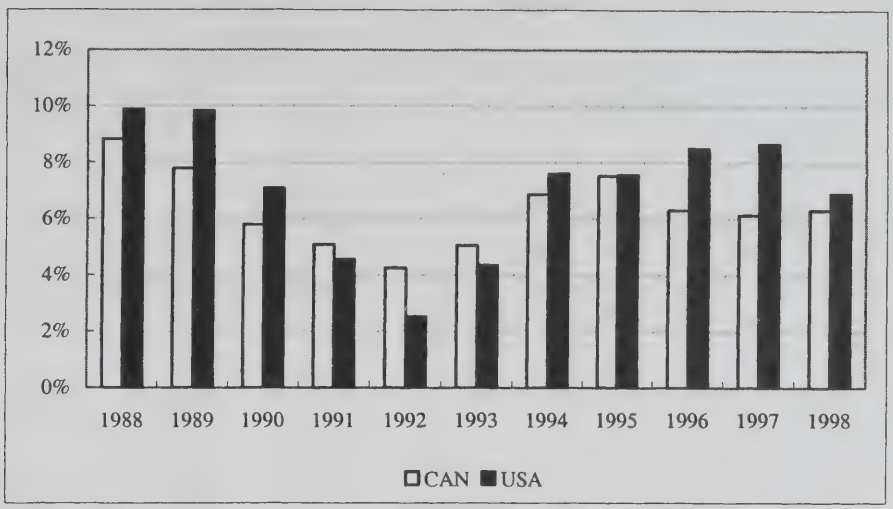
The remainder of this paper is organized as follows; Section 3 contains a 'preliminary data analysis'—a description of some of the time-series features of the data. In Section 4, we outline theoretical models of profitability that are relevant to the empirical work undertaken here. Section 5 sketches findings from earlier work on profitability, and Section 6 describes the data employed here. Section 7 discusses the econometric approach used in estimation, and Section 8 presents the results. Section 9 concludes.

3. *Differences in profitability of Canadian- and U.S.-controlled firms*

Before we begin to model the differences between Canadian- and U.S.-controlled firms, it is useful to examine the profitability in each population. We do so by calculating the average return on capital employed for each group and plot them in Figure 1.

8. Section 6 of this paper includes a discussion of what constitutes a 'Canadian (U.S.)-controlled' enterprise.

Figure 1. Annual return on capital employed, large non-financial enterprises



The measure of 'profitability' employed is the *return on capital employed*. This ratio measures how well management has employed the assets under its control, by calculating the percentage return on total capital provided by the owners and lenders (i.e., the creditors). The earnings figure is before taking into account after-tax interest expense (payments to lenders) and dividends (payments to owners). The ratio indicates how many cents are returned to every dollar of capital invested. Formally we may write:

$$\text{Return on capital employed} = \frac{\text{net profit + after-tax interest expense}}{\text{short-term loans + long-term loans and debt + equity}}$$

The aggregate ratios for each group are calculated by first summing the values of the ratio's numerator for all observations in a particular class, then summing the values of the ratio's denominator for all observations in a particular class, and then dividing the former by the latter.[9] This is the approach taken in the Industrial Organization and Finance Division's (IOFD) *Financial and Taxation Statistics for Enterprises*.

Inspection of Figure 1 suggests a divergence between the rates of return on capital enjoyed by larger Canadian-controlled and U.S.-controlled enterprises is apparent throughout the decade. Firms controlled in the U.S. were generally more profitable than firms controlled in Canada, except for a brief period during recession of the early 1990s. Figure 1 does not control for size, leaving open the possibility that this result may reflect the different size composition of the Canadian-controlled and U.S.-controlled populations, and the overall superior profitability of larger enterprise. As a further step in this exploratory exercise, a regression was carried out in an attempt to control for size by using market share. Table 1 shows the results from carrying out this regression using data measured in levels (as opposed to the first-differenced form employed later in this paper).

9. In arriving at the ratio for a particular year, observations are assigned to the calendar year in which the fiscal period to which the observation pertains ends.

Table 1. OLS results (levels) for pooled Canadian/U.S. data

Variable	Return on capital employed	
	Coef	S.E.
Market share	.052	.016
U.S.-controlled	.020	.002
1990 q1	.076	.007
1990 q2	.069	.008
1990 q3	.057	.007
1990 q4	.068	.003
1991 q1	.062	.006
1991 q2	.059	.007
1991 q3	.045	.006
1991 q4	.051	.003
1992 q1	.051	.006
1992 q2	.051	.007
1992 q3	.044	.006
1992 q4	.045	.003
1993 q1	.057	.006
1993 q2	.048	.007
1993 q3	.049	.006
1993 q4	.049	.003
1994 q1	.063	.006
1994 q2	.076	.007
1994 q3	.067	.006
1994 q4	.061	.003
1995 q1	.064	.006
1995 q2	.059	.007
1995 q3	.063	.006
1995 q4	.059	.003
1996 q1	.051	.006
1996 q2	.053	.007
1996 q3	.065	.006
1996 q4	.063	.003
1997 q1	.064	.006
1997 q2	.066	.007
1997 q3	.065	.006
1997 q4	.066	.003
1998 q1	.060	.007
1998 q2	.072	.008
1998 q3	.069	.007

The regression is carried out on pooled Canadian and U.S. data using the 'return on capital employed' measure of 'profitability' described above.

The slight advantage enjoyed by U.S.-controlled enterprises in terms of returns on capital employed persists when we control for size.

We proceed now to model the individual firm profits in the two groups during the decade.

4. Theoretical framework

Profitability issues can be examined in a number of ways, and studies have varied widely in the definitions they have used, the questions that they have addressed, and the methods that they have employed.

In terms of "questions asked", a large number of studies concentrate on examining the "persistence of profitability"—an approach associated with Mueller (1990). The models associated with this approach tend to be extremely simple—usually just first-order autoregressions.[10]

Other studies address questions of profitability over the business cycle, using richer structural models that consider other factors besides just lagged profitability. These studies are usually based on the price-cost margin measure of 'profitability'. Within this framework, a number of approaches are possible, as Galeotti and Schiantarelli (1998) point out:

> "*Following the industrial organization tradition, a number of studies simply compute price-cost margins on the basis of the assumption that marginal and average variable costs are equal for the firm...another set of papers, using a production theoretic approach, estimates the optimality conditions for input demands.*"

The initial analysis undertaken in this study belongs to the approach that examines the effect of market structure on price-cost margins. Specifically, the underlying theoretical model may be thought of as corresponding—albeit somewhat loosely—to the theoretical framework of homogeneous product oligopoly developed by Cowling and Waterson (1976).

Estimation is carried out on the assumption that data are generated by enterprises in long-run equilibrium. In addition, this approach also assumes that data points are generated by firms whose production technology is such that average costs and marginal costs coincide. In essence, the approach ignores the contribution of any disequilibrium cost factors (returns to scale and fixities) that might be thought to generate a 'wedge' between marginal cost and market price.

Specifically, suppose that marginal costs are constant for each firm, but vary between firms. The ith firm sets output X_i to maximize profits $\Pi_i = pX_i - c_i X_i$ where p is price and c_i is marginal cost. Noting that price depends on total industry output ($p = p\left(\sum_{i=1}^{N} x_i\right)$), the equilibrium condition for the ith firm is given by

$$p\left\{1 - \frac{1}{\varepsilon}\frac{X_i}{X}\left(1+\lambda_i\right)\right\} = c_i \qquad (1)$$

10. Examples of this approach include Geroski and Jacquemin (1988), and—for Canada—Khemani and Shapiro (1990).

where λ_i is a conjectural variation term (expressing the output changes firm i would expect from rivals on altering output) and ε is the industry price elasticity of demand.[11]

Machin and van Reenen (1993) express (1.1) in terms of the profit margin $\left(\frac{\Pi}{S}\right)$ for the ith profit maximizing firm as

$$\left(\frac{\Pi}{S}\right)_i = MS_i(1+\lambda_i)/\varepsilon \qquad (2)$$

where MS_i is market share (i.e., X_i/X).

They go on to arrive at an estimable specification by modifying the Clarke and Davies (1982) approach of modeling the conjecture term as $\lambda_i = \alpha_i(1-MS_i)/MS_i$ to allow larger firms to have larger conjectures. They arrive at a formulation for conjectures of $\lambda_i = \alpha_{1i}(1-MS_i)/MS_i + \alpha_{2i}(1/MS_i)$, allowing them to generate an equation for profit margins given by

$$\left(\frac{\Pi}{S}\right)_i = [(1-MS_i)\alpha_{1i} + \alpha_{2i} + MS_i]/\varepsilon \qquad (3)$$

and go on to model the α coefficients as time-varying functions of industrial variables including concentration and union power.

The specification that is estimated in this paper may be regarded as being derived from a model like that outlined in equations (1) to (3). However, in line with other authors, we modify this specification by the addition of variables designed to capture possible influences on profitability other than those in equation (3).

A particular focus of recent work on price-cost margins (or, equivalently, profit-cost margins) has been the role of aggregate demand shocks in shaping firm-level profitability. This is an interesting question in light of the opposing predictions produced by game-theoretic models developed by Green and Porter (1984) and Rotemberg and Saloner (1986).

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11. We should note that Clarke and Davies generalize this framework by assuming that a parameter α (assumed the same for all firms) represents the degree of implicit collusion inherent in the market, and writing $p\left\{1-\frac{1}{\eta}\left(\frac{X_i}{X}-\alpha\frac{X_i}{X}+\alpha\right)\right\}=c_i$ (see Clarke and Davies p.279). They go on to point out that the "differential efficiency" versus "abuse of market power" explanations of the concentration/profitability relationship could be addressed using this equation. Specifically, a decomposition of profitability into two component parts—one due to "abuse", the other to "efficiency differences" could be arrived at *via* estimation of the above equation using firm level data within each industry on market shares and mark-ups. See Clarke and Davies p.284 for more details.

Green and Porter's model assumes that oligopolistic firms cannot immediately observe the output decisions and profits of other firms, and so cannot determine whether falling margins in recessions are due to negative demand shocks or the actions of rivals. In consequence, they produce at output levels designed to punish those rivals when industry price falls below a pre-set "trigger price". This results in *procyclical* price-cost margins.

In contrast, Rotemberg and Saloner's model is based on the notion that implicit collusion is more difficult for oligopolies when demand is relatively high. It predicts *counter-cyclical* margins will be observed.

We compare these two competing hypotheses in the more general of the two regressions discussed below.

Finally, Marston (1990), Krugman (1987) and others have developed models of 'pricing to market'. Such models predict a role for the exchange rate in determining profitability—and so we generalize one of our regression equations still further to allow for the notion that if demand becomes more (less) elastic as local currency prices rise, then the optimal markup charged by the exporter will fall (rise) as price in the buyer's currency increases.

In summary then, our estimated model is

$$\left(\frac{\Pi}{S}\right)_i = f(MS, X) = g(MS, GDP, EXCH)$$

where X is a set of time fixed effects in the first formulation. In the second formulation, these are replaced with the time-varying measures GDP (Gross Domestic Product) and EXCH (the Canada/U.S. exchange rate).

5. *Literature Survey*

Machin and van Reenen (1993) use profit margins as their measure of profitability—and employ a panel of 709 large U.K. companies in the 1970s and 1980s. They focus on the role of industry/firm level explanatory variables (market share, concentration, import intensity, trade unionism, and a lagged dependent variable designed to capture 'persistence') and aggregate effects, and carry out separate estimation for different product groups.

They initially considered a set of four models, varying with respect to the inclusion versus non-inclusion of 'interaction effects' (between market share and the other industry/firm level explanatory variables) and the inclusion of either the unemployment rate or a set of annual dummy variables to capture (common) aggregate effects.

In their preferred set of specifications, the effect of industrial concentration is estimated to be significantly positive even after controlling for market share. There are positive and significant market share and concentration effects, while import penetration and industrial union density are

both insignificant. There is significant evidence of persistence in profitability, and of procyclicality in profit margins.

Machin and van Reenen also provide separate estimates for firms in the producer goods, consumer durables, and consumer non-durables product groups. They find differences in timing between these groups with respect to the impact of aggregate shocks on profit margins, with margins for firms in the consumer durables and non-durables groups reacting a year before those in the producer goods group to the U.K. recession of the early 1980s. In addition, adjustment seems slower in the producer goods sector (as captured by a larger coefficient on the lagged dependent variable),

McDonald (1999) examines profitability in Australian manufacturing, using a firm-level panel data set on firm performance over the period 1984-93, using the ratio of net profits[12] to sales as a proxy for the price-cost margin. He uses a range of econometric techniques and specifications, estimating relationships in levels and differences and using the Arellano-Bond GMM estimator as well as the more traditional Anderson-Hsiao instrumental variable approach.

Five alternative specifications using profit levels are presented, which differ according to whether a capital intensity variable is included in the specification, whether or not specific year effects are included, whether allowance is made for firm-specific random effects, and the sample employed.[13] McDonald finds a highly significant coefficient on the lagged dependent variable (ranging from 0.77 to 0.51) in all five specifications, and concentration is also invariably significant and positively signed. Import penetration (measured at the industry level as the ratio of industry imports to the sum of industry imports plus home sales) is negatively signed in every specification, and statistically significant (at the 5% level) in three of them. Perhaps surprisingly, market share does not come close to being statistically significant—and is "incorrectly" (i.e., negatively) signed. Wage inflation is significant and negatively signed in all four of the specifications in which it plays a role.

McDonald also estimates a set of five equations specified in first differences, using the balanced sample. Concentration is dropped from these equations, and a 'benchmark' specification including import penetration, union density, market share, wage inflation, unemployment, a lagged dependent variable and the product of the unemployment rate and concentration is estimated using both Arellano-Bond GMM, and standard instrumental variables. In addition, two variants of the 'benchmark' are estimated using instrumental variables (IV). One has capital intensity included; another drops union density, wage inflation and the unemployment rate, but includes year dummies. Finally the 'benchmark-with-capital-intensity' specification is estimated on the full sample. Once again the lagged dependent variable is significant in every case, albeit somewhat smaller than in the levels equations (ranging from 0.32 to 0.41). The coefficient on import penetration is negative and significant in the 'benchmark' specification (whether estimated using IV or GMM) as well as in the 'benchmark-with-capital-intensity' specification and the 'annual dummies' specification. Interestingly, market share is only significant in the GMM-estimated equation, where it is 'incorrectly' (i.e., negatively) signed.

12. Net of depreciation and tax.
13. A 246 firm (2,214 observations) balanced panel *vs.* an 897 firm (4,786 observations) 'full' panel.

McDonald interprets the negative coefficient he obtains on the variable constructed as the product of the unemployment rate and concentration as evidence that profit margins are procyclical in industries where concentration is relatively high, but counter-cyclical otherwise.

6. Data

Profitability and market share are measured at the enterprise level, where an enterprise is defined as a "family of businesses under common control; the enterprise consists of one or more corporations, divisions, or plants engaged in relatively integrated activity for which a consolidated set of financial statements is produced." (Statistics Canada, 1994, 1998).

Clearly an important first question is how to define "profitability". Schmalensee (1989) lists 12 alternative measures of "profitability", noting that—in his sample—they "are not on average highly correlated" (p.337). Conyon and Machin (1991) have shown empirical results to be sensitive to the measure of profits used.

Here, we focus on two main measures of 'profitability' as our dependent variable. The first is the *price-cost margin*—defined as operating income divided by total operating revenue. This measure continues to be widely used in empirical work on profitability. As discussed earlier, it is central to a well defined theoretical model relating it to market demand elasticity, conjectural variation terms (which can be parameterized) and either the Herfindahl-index (at the industry level) or the enterprise's market share (at the level of the individual enterprise).

Whilst acknowledging that this measure may not correspond as well as might be desirable to economists' preferred 'profitability' measures, it may also be pointed out that the fact that the data series employed in this paper are first-differenced may reduce the impact of different inter-enterprise accounting conventions.[14]

The second measure of 'profitability' employed in this paper is the *return on capital employed.*

For the modelling exercise, we use only those records that satisfied a contiguity constraint that is discussed below. Following a number of other authors—including Arellano and Bond (1991)—enterprises were only included in the full sample if seven or more continuous observations were available.[15]

The data also only cover *large*, *non-integrated* enterprise. An enterprise was classified as *large* if its assets exceeded $25 million. An enterprise was classified as *non-integrated* using its 4-digit SIC-C code. The SIC-C was designed in such a way as to allow codes for integrated enterprises—enterprises whose activities spanned several industries. Enterprises with these codes were excluded from the sample.

14. At least insofar as those differences may be regarded as enterprise-specific, time-invariant fixed-effects.
15. See Appendix A for a discussion of the resulting patterns of contiguous observations that exist for the sample.

Throughout this analysis a distinction is drawn between Canadian-controlled and U.S.-controlled enterprises. A corporation is considered to be U.S.-controlled if a majority of its voting rights are held in the U.S., or are held by one or more Canadian corporations that are themselves U.S.-controlled. In the case of a multi-corporation enterprise, it is the enterprise head or parent that is considered first, and each subsidiary within the enterprise is assigned the same country of control as its enterprise parent. If the enterprise head is a Canadian resident corporation, the country of control is assigned to that country in which the majority of voting rights are held by both individuals and corporations.

Certain additional exclusions were made to the data. Negative sales were felt to be implausible/atypical, and observations containing such data were dropped from the sample. This left a number of records with very large negative profit margins however. In fact the most extremely negative 0.5% of these margins ranged from -294,700% to -900%. Such margins were felt to be implausible (or at least to be observations on enterprises in an 'atypical' state), and the records with the most extreme values (the top and bottom 1 percentiles) were dropped from the sample.

How representative of the population is the sample that we use? Figures 2, 3, 4 and 5 seek to answer this question graphically, by comparing the means for the sub-samples used to estimate the main regression results presented in this paper, with the (trimmed) means for the data base as a whole. It is evident that the sample broadly tracks the population as a whole.

Nonetheless, and despite the fact that selection of a sample with at least T observations is characteristic of most work using firm panels (i.e., Arellano and Bond, 1991), it must be acknowledged that the data employed in estimation was not randomly selected. In such circumstances the problem of selection bias can arise. Whilst possible 'biases' from dropping clearly aberrant observations may not constitute cause for concern, the focus on "contiguous" observations may be problematic, and certainly constitutes a possible source of bias (specifically we may have what Lancaster (1990) refers to as "length biased sampling") .

In addition, the fact that a large number of enterprises are present in the early stages of the panel, but then exit, constitutes another possible problem ("attrition bias").

Unfortunately, techniques for dealing with these problems are not yet well established for the case in which data are modeled with a lagged dependent variable. A number of solutions have been proposed for dealing with attrition bias in *static* panel data models. Here, in contrast to the widespread Heckman (1979) parametric approach (in which sample-selectivity is viewed as an omitted variable problem, and probits are used to generate a 'proxy' for the omitted variable) the focus in the panel literature appears to have been on using auxiliary (probit) regressions to produce a set of weights which are then used in estimation (essentially the weights attached to an observation are inversely proportional to the degree of selectivity bias to which an observation is likely to give rise).

Figure 2. Mean margins for sub-sample in Table 3, versus means for large, non-integrated, Canadian-controlled enterprises in ANNUAL_RELEASED

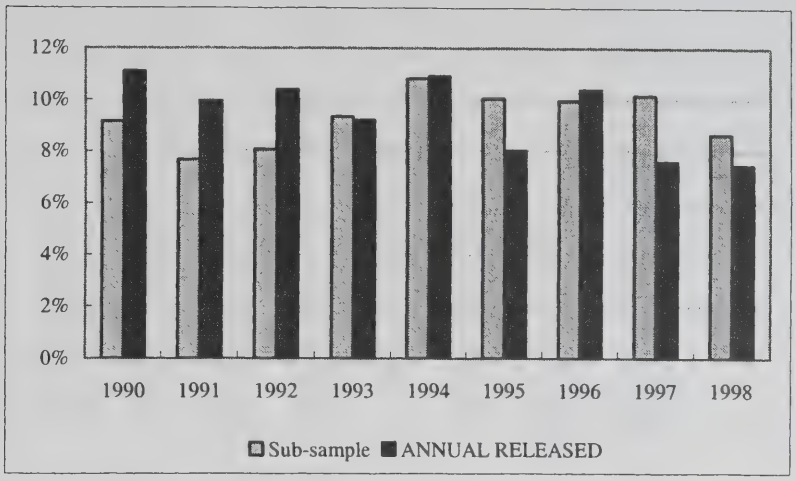


Figure 3. Mean margins for sub-sample in Table 3, versus means for large, non-integrated, U.S.-controlled enterprises in ANNUAL_RELEASED

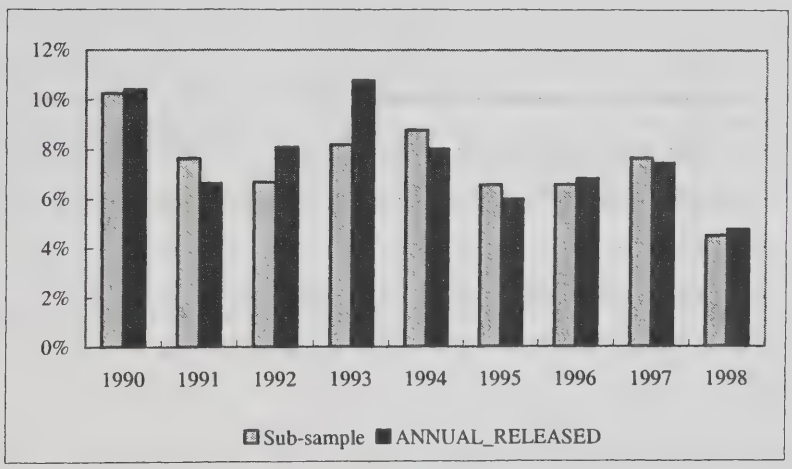


Figure 4. Mean returns on capital employed for sub-sample in Table 4, and for large, non-integrated, Canadian-controlled enterprises in ANNUAL_RELEASED

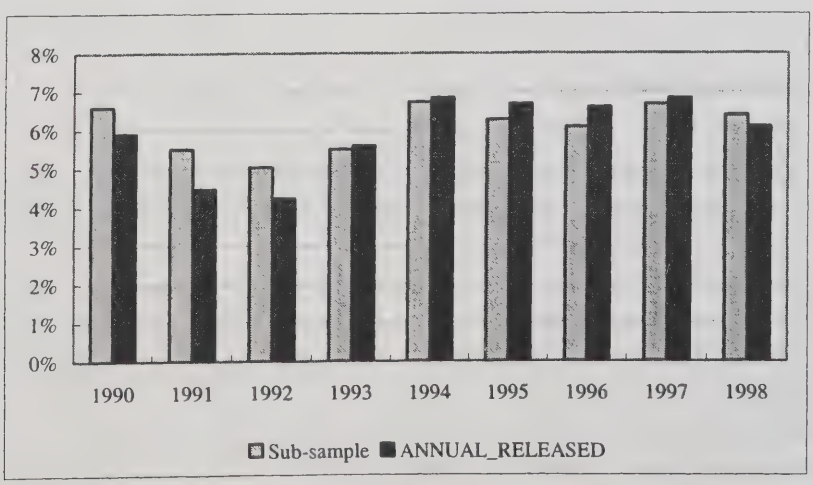
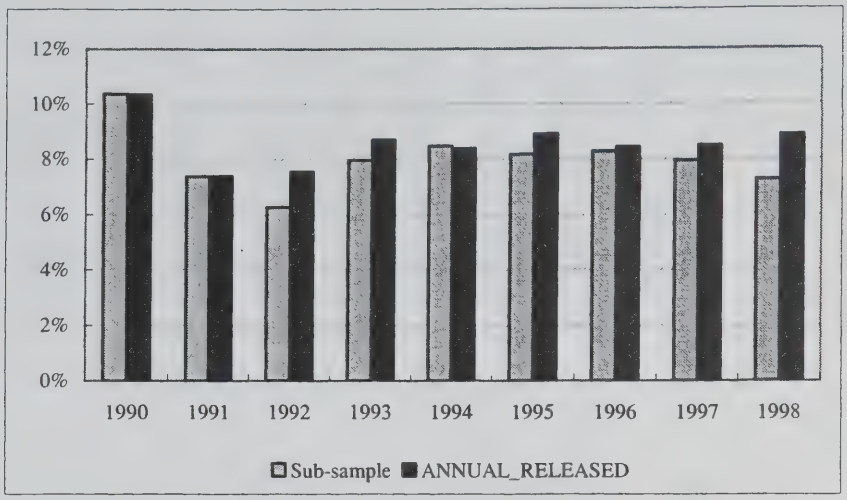


Figure 5. Mean returns on capital employed for sub-sample in Table 4, and for large, non-integrated, U.S.-controlled enterprises in ANNUAL_RELEASED



In the absence of such weights, the current 'state of the art' seems to be embodied in a pair of papers by Kyriazidou (1997, 1999). In her earlier paper, dealing with static panel data, Kyriazidou uses a couple of insights—that observations with similar regressor values will be subject to a similar degree of selection bias, and that differencing observations with similar degrees of selection bias will effectively remove that bias—to arrive at a rather complex 2-stage non-parametric estimator. In her later paper, Kyriazidou extends this approach to dynamic panels.

Given that the data presented a number of other challenges however, this paper does not attempt to adopt Kyriazidou's approach, and the results presented below have not been 'corrected' for sample selection bias.

It should be borne in mind however that—insofar as the likelihood of attrition in the sample is likely to be constant over time—any Heckman-like "correction term for selectivity" will be absorbed into the fixed individual-specific effect[16] and hence will be removed by the first-differencing transformation which is applied to the data before GMM estimation is carried out.

7. Econometric approach

Estimation is carried out using the Generalized Method of Moments (GMM) approach developed by Hansen (1982) and popularized in the panel-data context by Arellano and Bond (1991).

The main advantage of the various approaches to panel data that have been developed in the literature is that they allow us to control for individual-specific effects, usually by employing some kind of transformation of the data. The Arellano-Bond approach to dynamic panel data

16. Verbeek and Nijman, p.471 in Chapter 18 of Matyas and Sevestre's 1996 "*The Econometrics of Panel Data: A Handbook of the Theory With Applications*", Kluwer.

modelling that is employed here uses first-differencing to remove the individual specific effects, and deals with the consequent problems arising from inclusion of a lagged dependent variable in a model with serially-correlated errors by means of IV (instrumental variable) estimators.[17]

Arellano-Bond improve on earlier IV estimators developed for dynamic panel data models (i.e., Anderson and Hsiao, 1981) by recognizing that an increasing number of instruments becomes available to the econometrician for estimating the relationship that generates the later observations in the dataset.

Recently however, it has been recognized that Arellano-Bond estimation can suffer from both bias arising from the use of 'too many' instruments, as well as inefficiency arising from the fact that the first-differencing transformation employed essentially 'throws away' the information contained in the levels of the data. The estimates presented below attempt to avoid the problem of bias by a relatively parsimonious use of instruments; the problem of inefficiency is postponed for future work.[18]

The moment restrictions that give rise to the Arellano-Bond estimator rely crucially on the assumption that errors in the original (untransformed) data are not characterized by any form of serial correlation, and we employ three statistical tests to ensure this is the case.

The first of these is based on the m_2–statistic developed by Arellano and Bond, which takes the form

$$m_2 = \frac{\hat{v}'_{-2}\hat{v}_*}{\sqrt{\hat{v}}} \qquad (4)$$

and which is (asymptotically) distributed with mean zero and unit variance under the null hypothesis of no second order serial correlation in the first-difference residuals.

The second test employed is analogous to the m_2 based test, but tests for lack of first-order serial correlation in the first-difference residuals, in an attempt to determine whether the errors in the untransformed data follow a random walk. Finally, a Sargan test of over-identifying restrictions can be carried out using a statistic that has a chi-squared distribution asymptotically.

17. The econometric approach outlined above was implemented using the STATA software package.

18. Blundell and Bond (1998) demonstrate that dramatic improvements in efficiency can result from the use of an extended version of *system*-GMM. In the system-GMM approach to panel data estimation, lagged differences of the dependent variable are used as instruments for the (period-specific) equations in levels, in addition to using lagged levels of the dependent variable as instruments for the equation in differences (as is done here).

8. *Results*

Tables 2 and 3 contain the results from carrying out 2-step GMM estimation separately for sets of U.S.-controlled and Canadian-controlled enterprises, for two alternative measures of 'profitability'. Table 2 uses the price-cost margin as dependent variable—in first-difference form—and Table 3 uses the rate of return defined earlier.

Table 2 uses the 'price-cost margin' profitability measure, and for that reason, the results presented there might be expected to accord more closely with the predictions of the model presented in Section 3 of this paper. Results are presented for both 'Canadian-controlled' and 'U.S.-controlled' enterprises. The difference between columns (a) and (b) under each of these headings lies in the way in which the different specifications attempt to control for factors that will impact all enterprises similarly. In specification (a), this is done by the inclusion of dummy variables designed to capture time-varying fixed effects; in specification (b), it is done by inclusion of an explicit measure of the state of the business cycle (measures of GDP and the exchange rate).

The price-cost margins of Canadian-controlled enterprises over this period were positively related to both their margins in the previous financial year, and their current market share (Table 2). Both results are in line with prior expectations, and both are statistically significant at the 5% level.

Turning to the specification for Canadian-controlled enterprises that is outlined in Table 2, column (b), we see that both lagged profit margin and market share remain positively signed and statistically significant in an equation that replaces financial-period specific dummy variables with an explicit measure of the business cycle. The impact of the business cycle is not statistically significant (although it is close to being so at the 10% level, with a p-value of 0.123). Nevertheless, its sign is consistent with the predictions of the model developed by Green and Porter that suggests profitability will be pro-cyclical.

The exchange rate variable is significant at the 10% level, and positively signed. Bearing in mind that we have defined the exchange rate as the number of Canadian dollars per U.S. dollar (an increase in the ratio indicating a depreciation in the Canadian dollar) the sign is what we would expect if we imagine that exporters costs are predominantly denominated in Canadian dollar terms. In such a framework, an exporter who left the price charged in the U.S. (in $U.S. terms) unchanged following a depreciation in the value of the Canadian dollar would earn increased revenues in Canadian dollar terms.

As is the case with Canadian enterprises, U.S.-controlled enterprises also display persistent profitability, with a statistically significant and positive coefficient on lagged profitability—regardless of how we control for those factors that will impact all enterprises similarly.[19] But the coefficient is lower for U.S.-controlled enterprises, thereby suggesting that there is much lower persistence in this group. And what is more important, although the 'market share' variable is 'correctly' signed in both specifications (a) and (b) for U.S.-controlled firms, it is not statistically significant for this group of enterprises in either specification. This once again suggests that U.S.-controlled enterprises are less affected by domestic market conditions than are Canadian.

19. That is to say, regardless of whether we include time dummies or a business-cycle variable.

Table 2. GMM results for Canadian- versus U.S.-controlled large enterprises[20] using price-cost margin as the 'profitability' measure

Variable	Canadian-controlled				U.S.-controlled			
	(a)		(b)		(a)		(b)	
	Coef	S.E.	Coef	S.E.	Coef	S.E.	Coef	S.E.
Lagged profitability	0.401**	.035	0.424**	.036	0.371**	.057	0.317**	.062
Market share	0.426**	.157	0.401**	.157	0.171	.259	0.177	.266
GDP growth	-		0.157	.099	-	-	0.326**	.095
Exchange rate	-		0.051*	.028	-	-	-0.051	.037
1990 q1	0.016*	.009	-	-	-0.020	.018	-	-
1990 q2	-0.015	.013	-	-	-0.031**	.014	-	-
1990 q3	-0.009	.012	-	-	-0.017	.011	-	-
1990 q4	-0.009	.007	-	-	-0.006	.006	-	-
1991 q1	-0.006	.012	-	-	-0.016	.010	-	-
1991 q2	-0.048**	.018	-	-	-0.017	.012	-	-
1991 q3	-0.015	.016	-	-	-0.033**	.014	-	-
1991 q4	-0.021**	.008	-	-	-0.026**	.008	-	-
1992 q1	-0.025*	.015	-	-	-0.009	.016	-	-
1992 q2	-0.042**	.017	-	-	-0.006	.013	-	-
1992 q3	0.008	.016	-	-	-0.023	.016	-	-
1992 q4	-0.006	.007	-	-	-0.014*	.008	-	-
1993 q1	-0.001	.014	-	-	-0.029	.022	-	-
1993 q2	-0.036*	.019	-	-	-0.007	.014	-	-
1993 q3	0.011	.019	-	-	-0.007	.017	-	-
1993 q4	0.006	.007	-	-	0.006	.008	-	-
1994 q1	0.011	.016	-	-	0.005	.015	-	-
1994 q2	-0.024	.022	-	-	0.002	.016	-	-
1994 q3	0.034	.022	-	-	-0.004	.015	-	-
1994 q4	0.023**	.008	-	-	0.017*	.009	-	-
1995 q1	-0.004	.016	-	-	-0.02	.019	-	-
1995 q2	-0.111**	.038	-	-	-0.006	.020	-	-
1995 q3	0.044*	.026	-	-	0.013	.015	-	-
1995 q4	0.014**	.007	-	-	-0.002	.011	-	-
1996 q1	-0.011	.015	-	-	0.006	.022	-	-
1996 q2	-0.067**	.029	-	-	-0.015	.030	-	-
1996 q3	0.049	.034	-	-	-0.002	.015	-	-
1996 q4	0.007	.007	-	-	0.006	.011	-	-
1997 q1	-0.011	.021	-	-	-0.008	.028	-	-
1997 q2	-0.049*	.026	-	-	-0.025	.025	-	-
1997 q3	0.056*	.030	-	-	0.005	.016	-	-
1997 q4	0.011	.007	-	-	0.032**	.009	-	-
1998 q1	-0.033	.025	-	-	-0.021	.032	-	-
1998 q2	0.035	.027	-	-	-0.019	.033	-	-
1998 q3	0.029	.033	-	-	0.020	.018		
m_1 statistic		-6.26		-6.26		-3.71		-3.66
m_2 statistic		1.42		1.46		0.79		0.75
Sargan test statistic		17.55 (16)		16.33 (16)		23.42(16)		26.25 (16)

20. Coefficients that are significant at the 5% level are marked **. Those which are significant at the 10% level are marked *. When Arellano and Bond note that "caution would be advisable in making inferences based on the two-step estimator alone in samples of this size." (p.291) they are referring to a sample consisting of 700 observations. We have considerably more observations—so are willing to make such an inference.

In contrast to the finding that emerged from the Canadian-controlled sub-sample, the 'business cycle' variable is both significant and positively signed.

The exchange rate variable is 'incorrectly' signed, but statistically insignificant.

A major focus of this study is the issue of whether the profitability of Canadian-controlled enterprises evolved differently during the 1990s—relative to that of U.S.-controlled enterprises. The issue is addressed graphically—still employing the 'price-cost margin' measure of 'profitability' —in Figure 6.

The sequence of average shifts in the profitability equation for the price-cost margin for U.S.- and Canadian-controlled enterprises is graphed in Figure 6. These average annual shifts are computed from the dummy variable coefficients presented in Table 2.

Cumulated, the shifts shown in Figure 6 add up to an increase in price-cost margins for Canadian-controlled enterprises of roughly 1.3%, compared with an increase of 0.4% for U.S.-controlled enterprises. The profiles are broadly similar, in that for each year shown the direction of change is the same for both Canadian- and U.S.-controlled enterprises. The profile towards the end of the '90s is suggestive of some degree of 'catch up' in Canadian profitability following a downward 'shock' of around two-and-a-half percentage points around the middle of the decade.

In both specifications (a) and (b) using the Canadian-controlled sub-sample, the m_1 and m_2 statistics fail to invalidate the use of the GMM approach taken here, in the sense that we can reject the hypothesis that the average autocovariance in residuals of order 1 is zero, but cannot reject the hypothesis that the average autocovariance in residuals of order 2 is zero. We also fail to reject the null of no serial-correlation using Sargan's test of over-identifying restrictions. As far as the U.S.-controlled sub-sample is concerned, the m_1 and m_2 statistics also fail to invalidate the use of Arellano and Bond's GMM approach. The null of no serial-correlation survives Sargan's test of over-identifying restrictions at the 5% level, but would be rejected at the 10% level in the case of specification (b).

Table 3 presents results for the other measure of profitability—return on capital employed.

Lagged profitability is a strong and statistically significant determinant of current profitability in three out of the four equations estimated using this measure. The exception is the regression estimated for U.S.-controlled enterprises using time-dummies to control for cyclical effects.

Market share is 'correctly' signed in all four equations. It is statistically significant in both equations for Canadian-controlled enterprises, but in neither of the specifications estimated for U.S.-controlled enterprises.

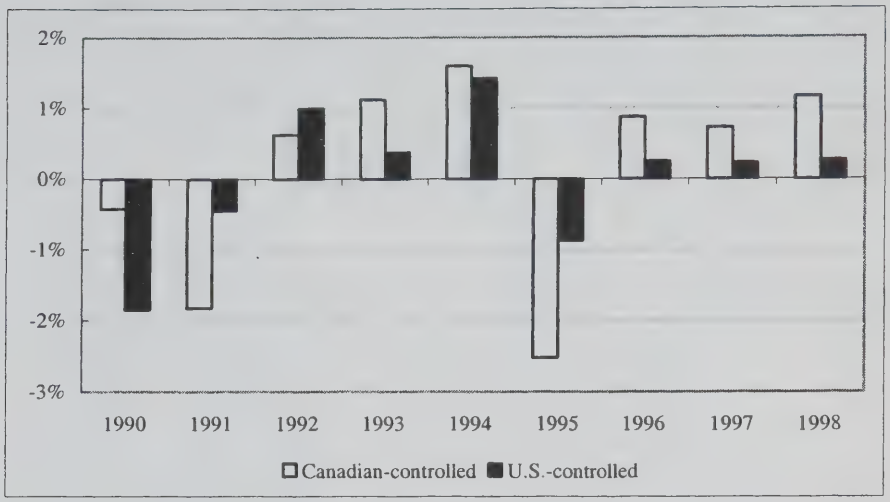
The variable measuring GDP growth is positively signed in both regressions in which it occurs. It is only statistically significant in one of them however—that for Canadian-controlled enterprises.

Table 3. GMM results for Canadian- versus U.S.-controlled large enterprises[21] using 'return on capital employed' as the 'profitability' measure

Variable	Canadian-controlled				U.S.-controlled			
	(a)		(b)		(a)		(b)	
	Coef	S.E.	Coef.	S.E.	Coef	S.E.	Coef	S.E.
Lagged profitability	0.318**	.023	0.344**	.024	0.460	.351	0.478**	.042
Market share	0.548**	.158	0.518**	.159	0.136	.364	0.128	.373
GDP growth	-		0.129**	.060	-		0.014	.110
Exchange rate	-		0.052**	.016			0.060*	.035
1990 q1	0.001	.009	-	-	-0.042**	.020	-	-
1990 q2	-0.012	.010	-	-	-0.062**	.022	-	-
1990 q3	-0.021**	.008	-	-	0.009	.030	-	-
1990 q4	-0.007**	.003	-	-	-0.013	.009	-	-
1991 q1	-0.022**	.007	-	-	-0.049**	.019	-	-
1991 q2	-0.019	.012	-	-	-0.054**	.015	-	-
1991 q3	-0.018**	.008	-	-	-0.057**	.018	-	-
1991 q4	-0.016**	.004	-	-	-0.025**	.008	-	-
1992 q1	-0.022**	.009	-	-	-0.048	.025	-	-
1992 q2	-0.020*	.011	-	-	-0.064**	.024	-	-
1992 q3	-0.019**	.008	-	-	-0.033*	.017	-	-
1992 q4	-0.013**	.005	-	-	-0.017**	.007	-	-
1993 q1	-0.019	.011	-	-	0.009	.026	-	-
1993 q2	-0.020*	.011	-	-	-0.039	.028	-	-
1993 q3	-0.007	.010	-	-	-0.043**	.019	-	-
1993 q4	-0.005	.005	-	-	-0.001	.007	-	-
1994 q1	-0.009	.012	-	-	-0.023	.029	-	-
1994 q2	0.008	.010	-	-	-0.03	.031	-	-
1994 q3	0.004	.010	-	-	-0.006	.017	-	-
1994 q4	0.006	.005	-	-	0.007	.008	-	-
1995 q1	-0.010	.014	-	-	0.002	.039	-	-
1995 q2	-0.012	.012	-	-	-0.048*	.025	-	-
1995 q3	-0.001	.009	-	-	-0.001	.019	-	-
1995 q4	-0.004	.004	-	-	0.005	.008	-	-
1996 q1	-0.024	.016	-	-	-0.003	.039	-	-
1996 q2	-0.018	.013	-	-	-0.031	.026	-	-
1996 q3	-0.008	.011	-	-	-0.006	.018	-	-
1996 q4	0.001	.005	-	-	0.014**	.007	-	-
1997 q1	-0.009	.021	-	-	-0.043	.052	-	-
1997 q2	-0.012	.015	-	-	-0.02	.021	-	-
1997 q3	0.007	.014	-	-	-0.01	.017	-	-
1997 q4	0.002	.005	-	-	0.011	.008	-	-
1998 q1	-0.03	.019	-	-	-0.01	.052	-	-
1998 q2	-0.025	.016	-	-	-0.010	.031	-	-
1998 q3	-0.008	.016	-	-	-0.006	.019	-	-
m_1 statistic		-12.89		-13.14		-8.16		-8.35
m_2 statistic		0.77		0.98		1.73		1.69
Sargan test statistic		10.07 (16)		13.45(16)		19.14(16)		15.89 (16)

21. Coefficients, which are significant at the 5% level in the on-step estimates, are marked **. Those significant at the 10% level are marked *.

Figure 6. Average change in price-cost margin (controlling for market share and lagged profitability) 1990-1998



The exchange rate variable is statistically significant in the equations for both the Canadian-controlled and U.S.-controlled sub-samples (at the 5% and 10% levels respectively). It is also 'correctly' (i.e., positively) signed in both regressions.

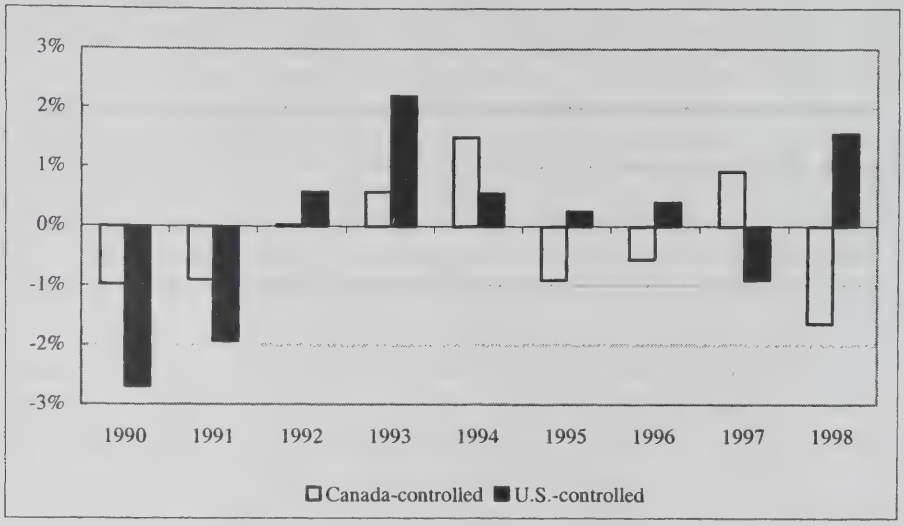
Two of the regressions presented in Table 3 control for 'cycle'-type effects using quarter specific time dummies, whose successive differences can be regarded as estimates of the shift in the intercept of the estimated equation that occurs between those two periods.

Figure 7 graphs the average annual shifts in the equation for the 'return on capital employed' measure of profitability, whilst controlling for market share and lagged profitability. For most of the period, profits as tracked by this measure move similarly to price-cost margins. From 1995 onwards however, some discrepancies arise. In particular, movements in the profitability of U.S. and Canadian firms become almost "mirror images" of each other, with U.S.-controlled enterprises showing a decline in profitability in 1997 as Canadian-controlled enterprises show an increase, and Canadian-controlled enterprises exhibiting negative changes in 1996 and 1998 while their U.S.-controlled counterparts enjoyed increased profitability.

Overall, the cumulative growth in profitability over the period amounts to 1.6 percentage points for U.S.-controlled and -1.9 percentage points for Canadian-controlled enterprises respectively.

For the case of the Canadian-controlled sub-sample, regression specifications (a) and (b) perform well in the three tests used to determine the appropriateness (or otherwise) of the GMM approach employed. We reject the null hypothesis that the average autocovariance in residuals of order 1 is zero, but we fail to reject the null that the average autocovariance in residuals of order 2 is zero. In addition, we fail to reject the null hypothesis underlying Sargan's test of overidentifying restrictions.

Figure 7. Average change in 'return on capital employed' (controlling for market share and lagged profits), Canada- versus U.S.-controlled enterprises 1990-1998



For the U.S.-controlled sub-sample, the picture is slightly less clear cut. Once again, we fail to reject H_0 for the Sargan tests in specifications (a) and (b). The null that the average first-order autocovariance in the residuals can be rejected. However, the corresponding null for the average second-order residuals can be rejected at the 10% level, for specification (a), although we fail to reject at the 5% level. For specification (b), we just reject at the 10% level (with a p-value of 0.092).

9. Conclusion

This study has focused on two questions. The first was the extent to which differences in profitability between Canadian- and U.S.-controlled enterprises existed and changed in the 1990s. The second was whether differences in the coefficients of estimated profit regressions suggest there were different forces at work in the two sets of firms, in particular whether market power differed and whether exogenous changes in the environment affected the two groups differently.

Over the 1990s, U.S.-controlled enterprises were generally more profitable that domestically-controlled enterprises. However, the evidence regarding the existence of any long term trend suggestive of a dramatic change in the differences between the two populations is mixed. Certainly regressions designed to capture movements in profitability over time using quarterly time dummies find little support for the notion that the profitability of large U.S.-controlled enterprises is on a declining trend relative to that of Canadian-controlled enterprises. Price-cost margins appear to have increased over the 1990s for both Canadian- and U.S.-controlled enterprises in the sample. In contrast, the 'return on capital employed' measure of profitability does show some divergence over the period, but not of a magnitude sufficient to suggest that it is an irreversible phenomenon.

The second issue that we have addressed is the role of ***market share*** in determining the profitability of Canadian- versus U.S.-controlled enterprises. As was the case for Machin and van Reenen (1993) and McDonald (1999), profits are a function of market share. But a consistent finding that emerges from this paper—across different specifications and measures of profitability—is that market share is considerably more important for Canadian-controlled enterprises than it is for U.S.-controlled enterprises. The associated coefficient is significant at the 5% level for the Canadian-controlled sub-sample in all four of the specifications in which it appears—but for none of the regressions that employ the U.S.-controlled sub-sample. In terms of magnitude, the point estimates of the coefficient vary (by specification) between 0.40 and 0.55 for the Canadian-controlled sub-sample, versus a range of between 0.13 and 0.18 for U.S.-controlled enterprises.

The Mueller approach to examining the persistence of profitability has tended to view the speed of mean-reversion in profitability measures as evidence of the degree to which members of the group under analysis (i.e., an industry) faces competitive behaviour. Specifically, a larger value for the coefficient on the ***lagged profitability*** measure tends to be regarded as evidence of less competitive behaviour, given that larger coefficients are associated with slower mean reversion. By this measure, Canadian-controlled enterprises appear to exhibit slightly less competitive behaviour than U.S.-controlled enterprises.

These findings accord with previous research that finds that it is more the foreign market structure than domestic structure that affects the performance of U.S.-controlled enterprises. Gorecki (1976) found that entry was negatively related in entry barriers for domestic firms but not for foreign firms. They also confirm Caves (1982, ch. 4) summary of a literature that suggests it is home market conditions more than host market structure that affects the performance of many multinationals. While we have not tested directly for the impact of home market structure, we have at least shown that it is not the size of the U.S.-controlled enterprise in Canada that is closely related to profitability, while it is for domestic-controlled enterprises.

The second set of evidence that differentiates the two groups is the extent to which profit persistence exists in the two groups. Canadian-controlled enterprises experience substantially more persistence in their profits than do U.S.-controlled enterprises. Profit persistence has been interpreted to imply that there are fewer competitive pressures on firms. Once again, this evidence suggests that it is domestic rather than foreign firms that face a less competitive environment.

The one finding that runs counter to this conclusion is the sign and significance of the procyclical variable GDP growth. Here, U.S.-controlled enterprises are more sensitive to changes in economic conditions. On the one hand, this might be interpreted to give support to the model of Green and Porter. But it equally well could simply be the result of U.S.-controlled enterprises being more sensitive to the North American cycle that affected Canada in the early 1990s because U.S.-controlled enterprises diversified more into these markets. Or it could have been because U.S.-controlled enterprises underwent more economic restructuring during the period that the Free Trade Agreement with the United States was being implemented.[22]

22. For evidence that foreign-controlled plants experience greater restructuring around a smaller set of products, see Baldwin, Beckstead and Caves (2001).

There is another interpretation of the differences between the two groups. It is useful to note that while price-cost margins for U.S.-controlled enterprises are sensitive to GDP growth, the rates of return are not. This suggests that increases in gross profit flows are accompanied by greater investment in the U.S.-controlled segment but not in the domestic segment.

The inclusion of an exchange rate variable in the regression equations allows us to distinguish between the effect of exchange rate fluctuations in the two groups.

Our finding that the ***exchange rate*** variable is positively signed in all of the specifications in which it is statistically significant at the 10% level or better is consistent with the hypothesis that Canadian exporters are pricing to world markets. Both the price-costs margins and the rate of return of domestic-controlled firms significantly increase when the Canadian dollar depreciates against the American dollar. But only the rate of return of U.S.-controlled enterprises is significantly affected—perhaps because price-costs margins reflect price changes in both the numerator and denominator while rates of return do not in the short run. More importantly, U.S.-controlled enterprises probably are more fully integrated into North American markets with a higher import content for the purchase of intermediate materials—and the latter are affected by depreciation of the dollar in a negative way.

Appendix A

Because the methodology employed in this paper requires the use of contiguous observations on similar units, the population was reduced to just those observations that provided this information.

The composition of the resultant samples is illustrated in Tables A1 and A2 below. The patterns of '1's and 'x's denote non-missing and missing data respectively, and all tables refer to the composition of the transformed[23] data. Thus the first line of Table A1(a) shows that the transformed data underlying the regressions presented in Table 2 had 685 enterprises for which observations existed for all 9 of the periods from 1990-1998 inclusive. There were 199 enterprises for which observations existed for 1990-1995.

Table A1(a). Patterns for sub-sample in Table 2, Canadian-controlled (a) and (b)

Number of enterprises displaying pattern	Percentage displaying pattern	Cumulative percentage	Pattern
685	39.14	39.14	111111111
199	11.37	50.51	111111xxx
151	8.63	59.14	x11111111
96	5.49	64.63	11111111x
76	4.34	68.97	xx1111111
71	4.06	73.03	1111111xx
57	3.26	76.29	xxx111111
50	2.86	79.14	x1111111x
28	1.60	80.74	xx111111x
337	19.26	100.00	(other patterns)
1,750	**100.00**		

Table A1(b). Patterns for sub-sample in Table 2, U.S.-controlled (a) and (b)

Number of enterprises displaying pattern	Percentage displaying pattern	Cumulative percentage	Pattern
237	50.11	50.11	111111111
21	4.44	54.55	x11111111
21	4.44	58.99	111111xxx
20	4.23	63.21	xx1111111
16	3.38	66.60	xxxxxxxx1
16	3.38	69.98	11111111x
13	2.75	72.73	xxxxxxx11
13	2.75	75.48	xxxxxx111
13	2.75	78.22	1111111xx
103	21.78	100.00	(other patterns)
473	**100.00**		

23. Differenced and lagged.

Table A2(a). Patterns for sub-sample in Table 3, Canadian-controlled (a) and (b)

Number of enterprises displaying pattern	Percentage displaying pattern	Cumulative percentage	Pattern
612	37.68	37.68	111111111
189	11.64	49.32	111111xxx
141	8.68	58.00	x11111111
98	6.03	64.04	11111111x
71	4.37	68.41	xx1111111
66	4.06	72.48	1111111xx
53	3.26	75.74	x1111111x
50	3.08	78.82	xxx111111
30	1.85	80.67	x111111xx
314	19.33	100.00	(other patterns)
1,624	**100.00**		

Table A2(b). Patterns for sub-sample in Table 3, U.S.-controlled (a) and (b)

Number of enterprises displaying pattern	Percentage displaying pattern	Cumulative percentage	Pattern
214	50.12	50.12	111111111
19	4.45	54.57	x11111111
19	4.45	59.02	111111xxx
17	3.98	63.00	xx1111111
17	3.98	66.98	11111111x
15	3.51	70.49	xxxxxxxx1
14	3.28	73.77	1111111xx
12	2.81	76.58	xxxxxxx11
12	2.81	79.39	xxxxxx111
88	20.61	100.00	(other patterns)
427	**100.00**		

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